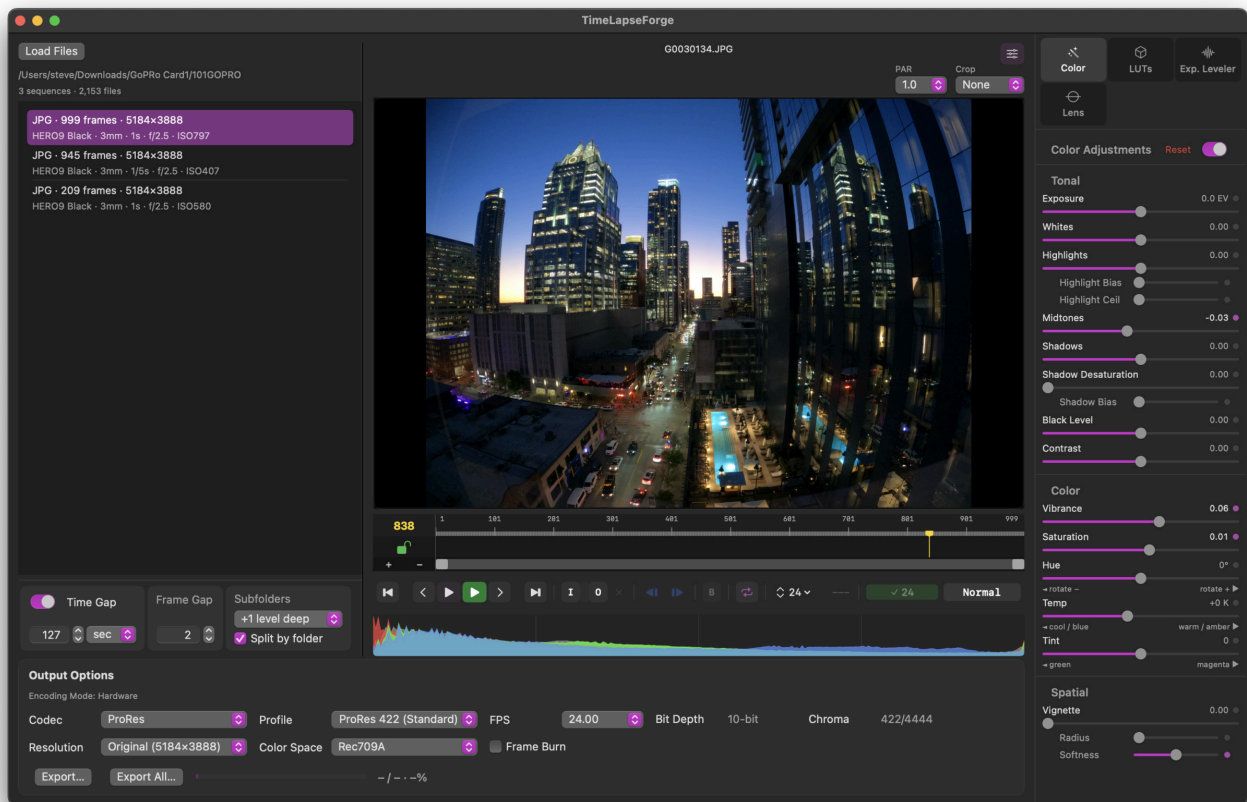


TimeLapse Forge

User Guide — Version 1.0 May 2026

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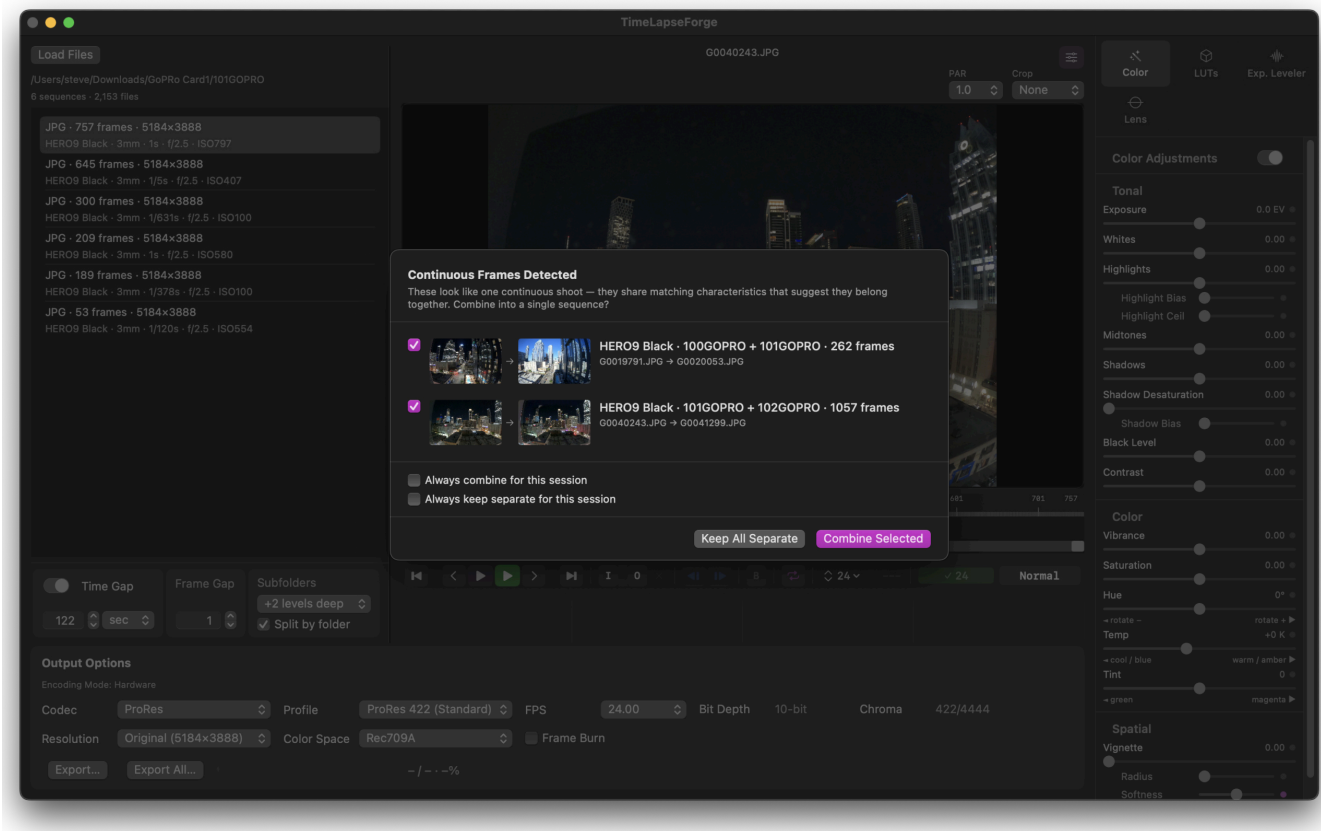
1. Introduction

TimeLapse Forge is a professional tool for converting image sequences into finished motion video. It is designed to eliminate complex, tedious manual workflows and external app dependencies by handling sorting, automatic sequence creation, processing, and export in a single application.

The application is deeply optimized for modern Apple Silicon systems, using multithreaded CPU processing, GPU acceleration, and intelligent resource management that scales to available hardware.

2. System Requirements

- macOS 15 or later
- Apple Silicon M1 or newer required. The more CPU performance cores and GPU cores equals improved performance.
- 16 GB RAM highly recommended. 8 GB supported with reduced sequence capacity.
- Fast internal or external SSD storage recommended for longer sequences.
- Any earlier macOS is NOT supported. TLF may run under macOS 14 but thats totally untested.
- Intel machines are unfortunately not supported due to their phase out and lack of future newer OS support.



3. Core Workflow

TimeLapse Forge is built around making the typical time lapse workflow simple and fast — from camera card to finished MOV ready for editing or delivery.

Load images → Preview in real time → Adjustments & Crop → Export

No intermediate mezzanine files like huge uncompressed 16bit TIFFs or external applications such as Lightroom are required. No need to install Python as TLF is a native app.

4. Loading Sequences

You can work directly off camera cards when you need a fast look at what you have. Most cards and readers will support 24fps play. For normal work, copying to an external SSD first is recommended.

You never need to sort files manually into subfolders for any mix of sequences, image formats or cameras.

This includes folders of mixed JPG, HIF, HEIC, DNG and various RAW files. Copy the entire card's DCIM folder or its subfolders over to your SSD. Even if your camera split sequences across folders of 9,999 images (DCIM spec limitation), or you shot multiple sequences into the same folder, TimeLapse Forge detects and sorts them automatically.

Example :

You started the day shooting a 400 frame JPG sequence. Great start. Then a few hours later you have a new scene to shoot. This time you realize that you should have been shooting 10bit HIF images for more correction ability and make that change. You shoot another 300 frames of HIF into the same folder. No worries. Yet a few hours later it's near sunset, the exposure seems tricky so you decide to burn card space shooting both RAW and HIF. There goes another 400 frames.

You can then bring that folder of images into TLF and it will generate :

Sequence 1: 1st set of 400 frames

Sequence 2: HIF 300 frames

Sequence 3: HIF 400 frames

Sequence 4: RAW 400 frames

Since sequence 3 and 4 are duplicates, you can delete the 3rd sequence by selecting it and hitting the DEL key, or using the contextual menu via right mouse button (control) click.

We have tested folders of 5,000 images where the sort and sequence management is near instant. The app has no technical limit to how many files it works with so don't be afraid to throw larger numbers of files at it. As an example you have a folder filled with thousands of images likely manually sorted by card number, day or date, camera body, etc. Big mess, TLF will zip through it.

4.1 Folder-Based Workflow

Select a top-level folder containing image files. The app automatically scans:

- Nested folders up to 2 levels deep
Card 1 / DCIM / Folder A
Card 1 / DCIM / Folder B, etc
- Mixed file formats in the same location
- Multiple sequences in one folder detected and sorted

4.2 Automatic Sequence Detection

TimeLapse Forge groups images into sequences based on:

- Filename patterns and file type
- Frame numbering
- Capture time metadata
- Time gaps between frames. This is user adjustable at the bottom of the sequence window, or can be disabled entirely

No problem! all these situations can be detected as separate sequences automatically or as single sequence based on your adjustment of the time gap tolerance. Setting the time gap tolerance to 1 or 2 minutes will keep sequences with short shooting gaps together, like when you changed a battery in the middle of a sequence. Using a larger gap like 10 minutes will detect shooting situations and intended gaps where you stopped and then started a new sequence. Its always adjustable to try different settings or even turn time gap off.

Did you shoot multiple sequences a few minutes apart? set a lower time gap of say, 120secs just a little larger than your actual time between frames will correctly break the first sequence from the second.

Changed a battery mid-shoot and kept going ? the interval spacing of a shot that should be every 10 or 30 secs is now broken. Adjust the time gap to a larger value to get the sequence to sort correctly.

TIP : its best to sort your sequences first before doing anything else with adjustments. Adjustments are stored per sequence so changing them will likely clear those changes if the sequence goes away in the sort. There is a warning dialog when this is detected asking if you want to proceed or not.

4.3 Supported Formats

Camera RAW: Canon CR2/ CR3, Nikon NEF, Fujifilm RAF (compressed and uncompressed), Sony ARW, Pentax, Olympus, Hasselblad, and others.

Standard formats: JPEG, HEIC/ HIF 10 bit, TIFF, DNG, PNG, GIF, PDF (JPEG-in-PDF), JPEG 2000 (.jp2, .j2k), OpenEXR (.exr), BMP, PSD, TGA, SGI, PICT.

In the files panel, the format of the images is indicated as part of the sequence name along with basic metadata such as camera, lens, ISO, shutter and aperture if available.

TIP : Camera metadata is read from the first still of a sequence. It will then be written into the exported MOV file of the same sequence. Its handy for tracking that info later if you need it.

Note: DNG written by other applications or cameras may vary in compatibility. Most “standard” DNG files work correctly.

5. Sequence Handling

5.1 Missing Frames

Missing or previously deleted frames are handled automatically. In the sequence window you can specify how many frames may be skipped or missing before

starting a new sequence. This prevents intentionally deleted bad frames from breaking a sequence into unnecessary pieces. The default value is 1 missing frame.

5.2 Midnight and Date Rollover

Sequences spanning midnight and date change are handled correctly and are not split at the time or date boundary change. Example shooting a galactic center sequence from 11PM through 2 AM is one sequence as intended.

9,999 Files Folder Rollover

That's a lot to say, but what does it mean? The DCIM spec says you are only supposed to have 9,999 max images in a folder before going into a new folder. Note that because the camera, with card changes, folder changes, could roll over at file 23,456 if the folder it's writing to hits the 9,999 folder limit. No problem, it's handled.

There is also another odd case due to the DCIM spec: no frame 0's. Technically it's reserved for "special data" but in reality it's an image the camera will skip writing. So expect 9,999 -> New Folder -> Frame 1, skipping frame 0. TLF has special logic to correctly handle this as you'd expect.

When TLF detects one of these situations, it will put up a dialog box showing the frames, and ask do you want to merge or keep the detected sequences separated. You can save your preference with the "remember my choice" checkbox if this pops up often. This setting is per session and can be reset in preferences.

5.3 Nested Folders

Multiple sequences across subfolders are detected and loaded together. Each sequence is organized independently. You can select if folders are intended as their own sequence do to previous manual sorting, or if there are continuations between folders because the camera created a new folder during shoot.

6. Playback and Review

Sequences can be previewed at standard frame rates directly in the app. Playback frame rate is set in the timeline transport bar via the menu. Right next to it is a FPS indicator.

Playback reflects current processing settings, allowing real-time evaluation without exporting.

The green cache bar in the timeline shows how many frames are held in RAM. With fast storage and JPEG sequences, playback often works smoothly even beyond the cached region. For processor-intensive formats like RAW, staying within the cached region gives the most accurate playback with adjustments.

Reducing the frame rate to 12fps or 6 fps can yield smoother playback on longer sequences of RAW images with fast storage and lots of cores.

How Realtime is TLF ?

Lets set expectations here. For now, 40MP RAW is not going to be realtime. It will require caching for RT playback for now – 2026. The frames cache can be adjusted in prefs depending on your machines actual RAM and if you want to use other apps at the same time.

On a machine with 8gb of RAM its not going to be a big RAM cache, so performance will be limited. You may find that you need to quit other apps to free up enough RAM for large enough cache.

With 16gb of RAM things start working well for longer sequences. 24gb is even better.

More CPU Performance CPU cores equals the best level of decode and playback. E cores are lower performing but save power. TLF has some optimizations to request performance cores, but the OS may not initially allocate them. After the

app runs a couple times the OS tracks the CPU load and will then more often give TLF performance cores.

Either way, more cores is more cores. On an older but still quite great M1 Ultra CPU TLF will decode 12-16frames in parallel. Its a fine sight to see. Its a great bump in speed having all those performance cores.

The use of cores is adjustable in prefs depending on if you want to do other work, or dedicate the time to TLF and processing your images.

So what about the real time playback again ?

JPG and HIF are the two most common lightweight formats cameras shoot. Our testing has shown this as a base starting point :

M4 : 5K GoPro jpg = 30FPS, 6K X 4K XH2s (26MP) 24-27 fps, HIF 6K 15-22 FPS

M1 Max : 5K GoPro jpg = 30FPS, 6K X 4K (26MP) 24-27 fps

Note that playing off the internal system SSD was slightly slower than using an external USB C SSD rated at 1,000MB/ sec. Best guess is that other apps and OS processes made the needed I/ O harder to sustain.

6.1 Keyboard Commands

Space Normal Play / Stop. Loads cache as needed, will play lighter formats in real time directly from storage when possible

Space +Shift : Start / stop play of cached frames only, looping on by default.

Left / Right arrow Move one frame

[Sets In Point

] Sets Out Point

I Set In point (trim sequence start, non-destructive)

O Set Out point (trim sequence end, non-destructive)

Option +I Clear In point

Option +O Clear Out point

B Toggle Blend repair current frame (Deflicker panel) on or off

+or =Zoom timeline in

– Zoom timeline out

0 Reset timeline zoom

6.2 Contextual Menus

In the files / sequence window, copy and paste adjustment settings between sequences. When pasting attributes a dialog will open to ask what settings to apply. Only settings which have been changed will have a selected check box.

7 PAR – Pixel Aspect Ratio

Located above the preview image area. The PAR control adjusts the display aspect ratio for sequences shot with anamorphic lenses. Common values are 1.0 (standard square pixel), 1.25, 1.33, 1.5, and 2.0.

This is a display and export transform. Source files are not modified.

Crop

Located above the preview image area. Crop provides common image frame ratios from 4:3, 16:9 through 2.35:1 and vertical video formats.

When enabled the crop box is drawn to show the area of the image to be used. In wide formats the Y position is adjustable, in tall formats the X is adjustable. The crop always uses the max width or height as appropriate.

Crop interacts with final output !

If the crop and output resolution match, then you will get a full image output with no letterbox.

If crop and output resolution don't match aspect ratios TimeLapse Forge picks the intelligent best predictable output option. Examples :

When NO crop is applied, selecting Native in the output resolution will create output mov of the same size and aspect as original image.

When no crop is applied, you select an output resolution aspect ratio that's different than the original. If the width of the output is shorter in height, then the output is a center cut out of the original image using its full width, cutting off the top and bottom of the original. In a vertical format output, the full height of the image is used and the image is center cut. The output resolution and aspect determines actual image.

Using crop to explicitly decide what you want in the output :

Your source is 4:3 action camera in 5K X 3.5K, you select 16:9 as your crop and position. On output you select 1920X1080 or 3860X2160 which are also 16:9 formats. Output fills the frame with no black edges.

Your source is the same 4:3 action camera in 5K X 3.5K, you select 2.39 as your crop and position it. On output you select 3860X2140 which is 16:9. The output top and bottom letter boxes the 2.39 image into the UHD frame.

What if you wanted to just have a 4K wide and native height image with no letterbox ? Select the 4K DCI 2.39:1 preset , or use custom output size to manually enter appropriate values.

Your source is the same 4:3 action camera in 5K X 3.5K, and you select 9:16 vertical format as the crop. On output you can select custom and 1080W X 1920H to get a full frame image with no black edges.

TimeLapse Forge does its best to produce reasonable expected results when things don't match.

7. Image Adjustments

7.1 Color Controls

Color adjustments are applied consistently across all frames in a sequence.

Exposure, Contrast, Saturation, Highlights, Shadows, Whites, and Blacks controls behave as expected.

The **Bias** controls on Highlights and Shadows adjust how broadly those corrections are applied across the tonal range. At center, the adjustment is wide and gradual. Pushing the bias increases focus toward the extreme end of that range — affecting fewer pixels more strongly. This is useful for targeting bright or dark areas while leaving the rest of the image relatively untouched.

Shadow Desaturation removes color from just the shadows. While it can be associated with some stylistic grading, its also quite useful for removing color casts. As example helping to tame IR contamination in the darkest parts of an image.

7.2 LUT Support

Up to two LUTs can be applied simultaneously and are processed in real time.

If Davinci Resolve is installed, its LUT folders are automatically detected — you don't need to duplicate files you've already installed.

TimeLapse Forge also has its own user LUT folder (path visible in Preferences) plus a fourth user-configurable path pointing anywhere on your system.

8. Exposure Leveler™

Exposure Leveler reduces exposure variation between individual frames and larger groups of frames. This uneven brightness that causes a flickering effect when a sequence is played back as video.

Typical causes:

- Lens iris not stopping down consistently between frames. Electronically activated on each exposure but not consistent
- Changing lighting conditions like flickering artificial lights, clouds partially covering the sun
- Inconsistent shutter or auto ISO
- Manually adjusting exposure during sequence to compensate for changing light.

Exposure Leveler will find individual frames first that exceed the exposure threshold set in the interface and adjust them. It will then expand out into leveling nearby frames and groups of frames. All automatically with user controls to adjust how much it adjusts.

Exposure Leveler is non-destructive. The correction is previewed in real time and never modifies source files.

8.1 Workflow

1. Select a sequence and switch to the **Exposure Leveler** panel
2. Click **Analyze** — this measures the luminance of every frame using GPU-accelerated analysis. The “exposure meter” is intelligent and not thrown off by moving bright spots like the sun or car headlights moving through.

TIP : if you have a case where the normal exposure meter fails, or you want to really isolate to a specific area it reads, there is a sample area tool.

Click the Sample Area button
Draw a box on the image, adjust it if needed
Click Done

Analyze will indicate it needs to Recalculate and will use just that area.

This setting is useful for isolating an area like a section of sky to base correction on. Testing with the new smart exposure meter tends to be so good at its job you probably won't need to use this tool.

3. The app displays a luminance graph and marks flagged frames on the timeline in blue

4. Review and adjust settings if needed, then click **Recalculate** to update. Its very fast as all the heavy measurement work is already done and saved.

5. The correction is applied in real time during playback and export

Analysis results are stored per sequence. Switching away to another sequence and back preserves the work.

If you do something that causes the sequences to be sorted differently like adjusting Time Gap, analysis is lost. There is a dialog that will open up to confirm the sequence changes.

8.2 Analysis Controls

Smooth Window — how many frames on either side to consider when determining the expected exposure at each frame. Smaller values (1–3 frames) are tighter and more responsive to rapid change. Larger values produce a smoother reference curve. A short frame measurement is good for single or small groups of frames that are off. When looking for longer corrections you can try increasing this.

Variation Threshold — how far a frame's exposure must deviate (in EV or F stops) before being flagged for correction. At 0.020 EV, only frames that differ meaningfully from their neighbors are marked. Raising this value reduces sensitivity. A good starting point for most sequences is 0.02–0.05 EV.

Max Correction — limits the maximum correction applied in stops. When a flagged frame has a large deviation, this prevents over-correction that can make a frame look obviously different. Start with Unlimited and reduce if corrections look too heavy. If the correction amount just doesn't work for a particular frame then look at the blend frame feature to fix problematic frames outside of a reasonable correction range.

When To Use The Rectangle To Limit Measurement Area

A dark warning triggers when >60% of the image pixels are below 22% perceptual brightness across >50% of frames — genuinely near-black backgrounds only, not just dim scenes

Bright warning triggers when >60% of the image pixels are above 93% perceptual — effectively only white backgrounds or overexposed skies near clipping

8.3 Correction Modes

Frame-by-Frame

Each flagged frame is independently corrected to match its immediate neighbors. The target exposure is the average of the frame immediately before and the frame immediately after, calculated in linear light. This is the choice for random single frames.

Group Smoothing

Designed for groups of consecutive frames that are all off. Instead of correcting each frame independently, the group is treated as a unit. The last frame before the run and the clean frame after it become target points. Each frame in the group receives a correction that interpolates smoothly between those two end

points producing a natural looking transition rather than a flat correction. This should handle gradual changes of overall light levels that happen when shooting day to night. The full monty of timelapse shooting.

The **Max group size** slider controls the longest run of frames treated this way. Runs longer than this fall back to Frame-by-Frame.

Tip: Use the sequence In and Out points to exclude genuinely unusable frames at the start or end of a sequence. **Exposure Leveler** cannot reliably correct frames that have no well exposed neighbors on one side.

8.4 The Luminance Graph

The graph shows raw frame luminance and the smooth reference curve the algorithm uses. Flagged frames appear as coloured markers on the graph. The current frame's EV offset is shown alongside — positive if the frame is brighter than expected, negative if darker.

The app also reports the general character of variation detected:

- **Flickery** — random frame-to-frame variation. Frame-by-Frame correction recommended.
- **Ramped** — gradual brightness shift across the sequence.

8.5 Correction Strength — Per Zone

Three sliders let you control how much of the computed correction is applied to different tonal ranges:

- **Shadows** — very dark areas
- **Mids** — the bulk of normal scene content
- **Highlights** — bright areas like sky and lit surfaces

At 1.0 (default) full correction is applied to that zone. At 0, no correction is applied. At 2.0 the correction is doubled. Pixels at very high brightness, specular reflections, direct light sources, are never corrected regardless of slider positions.

These sliders apply per-frame and can be set individually for each frame. A purple dot on the Correction Strength header indicates the current frame has custom zone settings.

8.6 Individual Frame Repair

When a frame is too far off to correct cleanly, or is genuinely unusable due to motion blur, vibration, camera bump, etc it can be repaired by deleting and blending with adjacent frames. This is a non-destructive operation and can be toggled on or off to see how the fix works.

Enable **Frame Blending** in the Frame Repair section. Navigate to the bad frame and press **B** or the B button in the transport bar area. The frame is removed from display non-destructively and replaced with a blend of the surrounding frames.

Blend modes:

- **Blend 1 frame** — dissolve between the immediately adjacent frames
- **Blend 2 frames** — blend across a wider neighbourhood
- **Optical Flow 1 or 2 frames** — motion-aware interpolation between neighbours. Better for sequences with camera movement such as slider move, pan, rotation. It takes slightly longer to compute the frame but does run on the GPU.

Playing the sequence is the best way to judge which blend mode works for a given shot.

9. Exposure Ramping

For sequences that span a large change in ambient light like dawn to dusk, shooting into the night, the exposure drift is gradual and intentional rather than

random frame-to-frame error. **Exposure Leveler** as a V 1.0 may handle this well, but we are still testing examples. Try it, let us know how it works.

Many modern cameras include an Exposure Smoothing option in the interval timer settings. When at least one exposure parameter is set to Auto, the camera adjusts exposure gradually between frames as smoothly as possible. Nikon Z series cameras have an effective implementation. Newer Fujifilm X-series bodies also include this feature. We highly recommend using this feature to help smooth out the exposure in camera as much as possible.

10. Export

10.1 Supported Codecs

- **ProRes** — Apple ProRes 422, 422 HQ, 4444. Recommended for editing workflows.
- **H.264** — Broad compatibility, smaller file sizes. Good for delivery and web. 4:2:0, 4:2:2 8 and 10 bit options available.
- **H.265 / HEVC** — Higher compression efficiency at comparable quality.
- All hardware accelerated when possible depending on settings. Later model M2+series processors have expanded capabilities like 4:2:2 support vs 4:2:0 on M1.

TIP : Need MXF ? Rewrap MOV → MXF after export. Use `ffmpeg -i output.mov -c copy output.mxf` which rewraps ProRes from MOV to MXF Op1a with no re-encode. This takes seconds to do. The codec data is identical. There are commercial apps that can also do this.

10.2 Bit Depth and Chroma

- 8-bit and 10-bit output (codec dependent)
- 4:2:0, 4:2:2, 4:4:4 chroma subsampling (codec dependent)

10.3 Resolution

- Original frame size
- Standard presets: 4K UHD, QHD, 1080p
- Custom width and height

10.4 Frame Rates

23.976, 24.00, 25.00, 29.97, 30.00

10.6 Hardware Encoding

When available, hardware encoding is used automatically for faster export with lower CPU load. This is CPU model dependent. The app intelligently reads the hardware resources available at startup and sets it self up accordingly.

11. Preferences

11.1 Performance Modes

TimeLapse Forge includes three performance presets to balance speed against system resource usage:

- **Low** — leaves more headroom for other applications running alongside
- **Medium** — balanced, good default for most workflows
- **Max** — full system utilization; fastest processing, best used when the app has priority and you need it done ASAP.

These settings control RAM allocation, CPU threading, and decode throughput. Higher settings require more available RAM and work best on M1 Pro/ Max/ Ultra or M2+ systems.

12.

TimeLapse Forge is developed by Practical Illusions LLC. timelapseforge.com